The following tables, reproduced directly from Russell et al. (1997b), show their recommended dose estimates at all stages of pregnancy for many (over 80) radiopharmaceuticals. Compounds for which some information was available regarding placental crossover are shown in shaded rows. It is very important to remember that these dose estimates depend directly on the residence times assumed for each radiopharmaceutical (as catalogued in the article by Russell et al., but not reproduced here). Any changes in the biokinetic models assumed will cause a change in the dose estimates calculated.

Table 1. Absorbed Dose Estimates to the Embryo/Fetus Per Unit Activity of Radiopharmaceutical Administered to the Mother (shading indicates maternal and fetal self dose contributions) (From Russell et al. (1997b)).

Radiopharmaceutical	Early mGy/MBq	3 Month mGy/MBq	6 Month mGy/MBq	9Month mGy/MBq
^{57}Co Vitamin B-1, Normal-Flushing	1.0×10^{0}	6.8×10^{-1}	8.4×10^{-1}	8.8×10^{-1}
^{57}Co Vitamin B-12, Normal-No Flushing	1.5×10^{0}	1.0×10^{0}	1.2×10^{0}	1.3×10^{0}
^{57}Co Vitamin B-12, PA- Flushing	2.1×10^{-1}	1.7×10^{-1}	1.7×10^{-1}	1.5×10^{-1}
^{57}Co Vitamin B-12, PA- No Flushing	2.8×10^{-1}	2.1×10^{-1}	2.2×10^{-1}	2.0×10^{-1}
^{58}Co Vitamin B-12, Normal Flushing	2.5×10^{0}	1.9×10^{0}	2.1×10^{0}	2.1×10^{0}
^{58}Co Vitamin B-12, Normal-No Flushing	3.7×10^{0}	2.8×10^{0}	3.1×10^{0}	3.1×10^{0}
^{58}Co Vitamin B-12, PA-Flushing	8.3×10^{-1}	7.4×10^{-1}	6.4×10^{-1}	4.8×10^{-1}
^{58}Co Vitamin B-12, PA-No Flushing	9.8×10^{-1}	8.5×10^{-1}	7.6×10^{-1}	6.0×10^{-1}
^{60}Co Vitamin B-12, Normal Flushing	3.7×10^{1}	2.8×10^{1}	3.1×10^{1}	3.2×10^{1}
^{60}Co Vitamin B-12, Normal-No Flushing	5.5×10^{1}	4.2×10^{1}	4.7×10^{1}	4.7×10^{1}
^{60}Co Vitamin B-12, PA-Flushing	5.9×10^{0}	4.7×10^{0}	4.8×10^{0}	4.5×10^{0}
^{60}Co Vitamin B-12, PA-No Flushing	8.3×10^{0}	6.5×10^{0}	6.8×10^{0}	6.5×10^{0}
^{18}F FDG	2.7×10^{-2}	1.7×10^{-2}	9.4×10^{-3}	8.1×10^{-3}
^{18}F Sodium Fluoride	2.2×10^{-2}	1.7×10^{-2}	7.5×10^{-3}	6.8×10^{-3}
^{67}Ga Citrate	9.3×10^{-2}	2.0×10^{-1}	1.8×10^{-1}	1.3×10^{-1}
^{123}I Hippuran	3.1×10^{-2}	2.4×10^{-2}	8.4×10^{-3}	7.9×10^{-3}
^{123}I IMP	1.9×10^{-2}	1.1×10^{-2}	7.1×10^{-3}	5.9×10^{-3}
^{123}I MIBG	1.8×10^{-2}	1.2×10^{-2}	6.8×10^{-3}	6.2×10^{-3}
^{123}I Sodium Iodide	2.0×10^{-2}	1.4×10^{-2}	1.1×10^{-2}	9.8×10^{-3}
^{124}I Sodium Iodide	1.4×10^{-1}	1.0×10^{-1}	5.9×10^{-2}	4.6×10^{-2}
^{125}I HSA	2.5×10^{-1}	7.8×10^{-2}	3.8×10^{-2}	2.6×10^{-2}
^{125}I IMP	3.2×10^{-2}	1.3×10^{-2}	4.8×10^{-3}	3.6×10^{-3}
^{125}I MIBG	2.6×10^{-2}	1.1×10^{-2}	4.1×10^{-3}	3.4×10^{-3}
^{125}I Sodium Iodide	1.8×10^{-2}	9.5×10^{-3}	3.5×10^{-3}	2.3×10^{-3}
^{126}I Sodium Iodide	7.8×10^{-2}	5.1×10^{-2}	3.2×10^{-2}	2.6×10^{-2}
^{130}I Sodium Iodide	1.8×10^{-1}	1.3×10^{-1}	7.6×10^{-2}	5.7×10^{-2}
^{131}I Hippuran	6.4×10^{-2}	5.0×10^{-2}	1.9×10^{-2}	1.8×10^{-2}
^{131}I HSA	5.2×10^{-1}	1.8×10^{-1}	1.6×10^{-1}	1.3×10^{-1}
^{131}I MAA	6.7×10^{-2}	4.2×10^{-2}	4.0×10^{-2}	4.2×10^{-2}
^{131}I MIBG	1.1×10^{-1}	5.4×10^{-2}	3.8×10^{-2}	3.5×10^{-2}
^{131}I Sodium Iodide	7.2×10^{-2}	6.8×10^{-2}	2.3×10^{-1}	2.7×10^{-1}
^{131}I Rose Bengal	2.2×10^{-1}	2.2×10^{-1}	1.6×10^{-1}	9.0×10^{-2}
^{111}In DTPA	6.5×10^{-2}	4.8×10^{-2}	2.0×10^{-2}	1.8×10^{-2}
^{111}In Pentetreotide	8.2×10^{-2}	6.0×10^{-2}	3.5×10^{-2}	3.1×10^{-2}
^{111}In Platelets	1.7×10^{-1}	1.1×10^{-1}	9.9×10^{-2}	8.9×10^{-2}
^{111}In Red Blood Cells	2.2×10^{-1}	1.3×10^{-1}	1.1×10^{-1}	8.6×10^{-2}
^{111}In White Blood Cells	1.3×10^{-1}	9.6×10^{-2}	9.6×10^{-2}	9.4×10^{-2}
^{99m}Tc Albumin Microspheres	4.1×10^{-3}	3.0×10^{-3}	2.5×10^{-3}	2.1×10^{-3}
^{99m}Tc Disofenin	1.7×10^{-2}	1.5×10^{-2}	1.2×10^{-2}	6.7×10^{-3}

^{99m}Tc DMSA	5.1×10^{-3}	4.7×10^{-3}	4.0×10^{-3}	3.4×10^{-3}
^{99m}Tc DTPA	1.2×10^{-2}	8.7×10^{-3}	4.1×10^{-3}	4.7×10^{-3}
^{99m}Tc DTPA Aerosol	5.8×10^{-3}	4.3×10^{-3}	2.3×10^{-3}	3.0×10^{-3}
^{99m}Tc Glucoheptonate	1.2×10^{-2}	1.1×10^{-2}	5.3×10^{-3}	4.6×10^{-3}
^{99m}Tc HDP	5.2×10^{-3}	5.4×10^{-3}	3.0×10^{-3}	2.5×10^{-3}
^{99m}Tc HEDP	7.2×10^{-3}	5.2×10^{-3}	2.7×10^{-3}	2.4×10^{-3}
^{99m}Tc HMPAO	8.7×10^{-3}	6.7×10^{-3}	4.8×10^{-3}	3.6×10^{-3}
^{99m}Tc Human Serum Albumin	5.1×10^{-3}	3.0×10^{-3}	2.6×10^{-3}	2.2×10^{-3}
^{99m}Tc MAA	2.8×10^{-3}	4.0×10^{-3}	5.0×10^{-3}	4.0×10^{-3}
^{99m}Tc MAG3	1.8×10^{-2}	1.4×10^{-2}	5.5×10^{-3}	5.2×10^{-3}
^{99m}Tc MDP	6.1×10^{-3}	5.4×10^{-3}	2.7×10^{-3}	2.4×10^{-3}
^{99m}Tc MIBI-rest	1.5×10^{-2}	1.2×10^{-2}	8.4×10^{-3}	5.4×10^{-3}
^{99m}Tc MIBI-stress	1.2×10^{-2}	9.5×10^{-3}	6.9×10^{-3}	4.4×10^{-3}
^{99m}Tc Pertechnetate	1.1×10^{-2}	2.2×10^{-2}	1.4×10^{-2}	9.3×10^{-3}
^{99m}Tc PYP	6.0×10^{-3}	6.6×10^{-3}	3.6×10^{-3}	2.9×10^{-3}
^{99m}Tc RBC-Heat Treated	1.7×10^{-3}	1.6×10^{-3}	2.1×10^{-3}	2.2×10^{-3}
^{99m}Tc RBC-in vitro	6.8×10^{-3}	4.7×10^{-3}	3.4×10^{-3}	2.8×10^{-3}
^{99m}Tc RBC-in vivo	6.4×10^{-3}	4.3×10^{-3}	3.3×10^{-3}	2.7×10^{-3}
^{99m}Tc Sulfur Colloid-normal	1.8×10^{-3}	2.1×10^{-3}	3.2×10^{-3}	3.7×10^{-3}
^{99m}Tc Sulfur Colloid-Liver Disease	3.2×10^{-3}	2.5×10^{-3}	2.8×10^{-3}	2.8×10^{-3}
^{99m}Tc Teboroxime	8.9×10^{-3}	7.1×10^{-3}	5.8×10^{-3}	3.7×10^{-3}
^{99m}Tc White Blood Cells	3.8×10^{-3}	2.8×10^{-3}	2.9×10^{-3}	2.8×10^{-3}
^{201}Tl Chloride	9.7×10^{-2}	5.8×10^{-2}	4.7×10^{-2}	2.7×10^{-2}
^{127}Xe, 5 minute rebreathing, 5 liter spirometer volume	4.3×10^{-4}	2.4×10^{-4}	1.9×10^{-4}	1.5×10^{-4}
^{127}Xe, 5 minute rebreathing, 7.5 liter spirometer volume	2.3×10^{-4}	1.3×10^{-4}	1.0×10^{-4}	8.4×10^{-5}
^{127}Xe, 5 minute rebreathing, 10 liter spirometer volume	2.3×10^{-4}	1.4×10^{-4}	1.1×10^{-4}	9.2×10^{-5}
^{133}Xe, 5 minute rebreathing, 5 liter spirometer volume	4.1×10^{-4}	4.8×10^{-5}	3.5×10^{-5}	2.6×10^{-5}
^{133}Xe, 5 minute rebreathing, 7.5 liter spirometer volume	2.2×10^{-4}	2.6×10^{-5}	1.9×10^{-5}	1.5×10^{-5}
^{133}Xe, 5 minute rebreathing, 10 liter spirometer volume	2.5×10^{-4}	2.9×10^{-5}	2.1×10^{-5}	1.6×10^{-5}
^{133}Xe, injection	4.9×10^{-6}	1.0×10^{-6}	1.4×10^{-6}	1.6×10^{-6}

TABLE 2. Fetal Dose Estimates from Various Nuclear Medicine Procedures (shading indicates maternal and fetal self dose contributions) (From Russell et al. (1997b))

Radiopharmaceutical	Activity Administered MBq (mCi)	Fetal Dose Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month, mGy (rad)
^{57}Co Vitamin B-12 Normal-Flushing	0.04 (0.001)	4.0×10^{-2} (4.0×10^{-3})	2.7×10^{-2} (2.7×10^{-3})	3.4×10^{-2} (3.4×10^{-3})	3.5×10^{-2} (3.5×10^{-3})
^{57}Co Vitamin B-12 Normal-No Flushing	0.04 (0.001)	6.0×10^{-2} (6.0×10^{-3})	4.0×10^{-2} (4.0×10^{-3})	4.8×10^{-2} (4.8×10^{-3})	5.2×10^{-2} (5.2×10^{-3})
^{57}Co Vitamin B-12 Pernicious Anemia-Flushing	0.04 (0.001)	8.4×10^{-3} (8.4×10^{-4})	6.8×10^{-3} (6.8×10^{-4})	6.8×10^{-3} (6.8×10^{-4})	6.0×10^{-3} (6.0×10^{-4})
^{57}Co Vitamin B-12 Pernicious Anemia-No Flushing	0.04 (0.001)	1.1×10^{-2} (1.1×10^{-3})	8.4×10^{-3} (8.4×10^{-4})	8.8×10^{-3} (8.8×10^{-4})	8.0×10^{-3} (8.0×10^{-4})
^{58}Co Vitamin B-12 Normal-Flushing	0.03 (0.0008)	7.5×10^{-2} (7.5×10^{-3})	5.7×10^{-2} (5.7×10^{-3})	6.3×10^{-2} (6.3×10^{-3})	6.3×10^{-2} (6.3×10^{-3})
^{58}Co Vitamin B-12 Normal-No Flushing	0.03 (0.0008)	1.1×10^{-1} (1.1×10^{-2})	8.4×10^{-2} (8.4×10^{-3})	9.3×10^{-2} (9.3×10^{-3})	9.3×10^{-2} (9.3×10^{-3})
^{58}Co Vitamin B-12 Pernicious Anemia-Flushing	0.03 (0.0008)	2.5×10^{-2} (2.5×10^{-3})	2.2×10^{-2} (2.2×10^{-3})	1.9×10^{-2} (1.9×10^{-3})	1.4×10^{-2} (1.4×10^{-3})
^{58}Co Vitamin B-12 Pernicious Anemia-No Flushing	0.03 (0.0008)	2.9×10^{-2} (2.9×10^{-3})	2.6×10^{-2} (2.6×10^{-3})	2.3×10^{-2} (2.3×10^{-3})	1.8×10^{-2} (1.8×10^{-3})
^{18}F FDG	370 (10)	1.0×10^{1} (1.0×10^{0})	6.3×10^{0} (6.3×10^{-1})	3.5×10^{0} (3.5×10^{-1})	3.0×10^{0} (3.0×10^{-1})
^{67}Ga Citrate	190 (5)	1.8×10^{1} (1.8×10^{0})	3.8×10^{1} (3.8×10^{0})	3.4×10^{1} (3.4×10^{0})	2.5×10^{1} (2.5×10^{0})
^{197}Hg Chlormerodrin	4 (0.1)	4.4×10^{-2} (4.4×10^{-3})	3.0×10^{-2} (3.0×10^{-3})	2.7×10^{-2} (2.7×10^{-3})	2.8×10^{-2} (2.8×10^{-3})
^{123}I Hippuran	75 (2)	2.3×10^{0} (2.3×10^{-1})	1.8×10^{0} (1.8×10^{-1})	6.3×10^{-1} (6.3×10^{-2})	5.9×10^{-1} (5.9×10^{-2})
^{123}I IMP	200 (5.5)	3.8×10^{0} (3.8×10^{-1})	2.2×10^{0} (2.2×10^{-1})	1.4×10^{0} (1.4×10^{-1})	1.2×10^{0} (1.2×10^{-1})
^{123}I MIBG					
phaeochromocytoma	350 (9.5)	6.3×10^{0} (6.3×10^{-1})	4.2×10^{0} (4.2×10^{-1})	2.4×10^{0} (2.4×10^{-1})	2.2×10^{0} (2.2×10^{-1})
cecholamine tumor	80 (2)	1.4×10^{0} (1.4×10^{-1})	9.6×10^{-1} (9.6×10^{-2})	5.4×10^{-1} (5.4×10^{-2})	5.0×10^{-1} (5.0×10^{-2})
^{123}I Sodium Iodide					
thyroid uptake study	30 (0.8)	6.0×10^{-1} (6.0×10^{-2})	4.2×10^{-1} (4.2×10^{-2})	3.3×10^{-1} (3.3×10^{-2})	2.9×10^{-1} (2.9×10^{-2})
thyroid imaging	15 (0.4)	3.0×10^{-1} (3.0×10^{-2})	2.1×10^{-1} (2.1×10^{-2})	1.7×10^{-1} (1.7×10^{-2})	1.4×10^{-2} (1.4×10^{-3})
^{125}I HSA	2 (0.05)	5.0×10^{-1} (5.0×10^{-2})	1.6×10^{-1} (1.6×10^{-2})	7.6×10^{-2} (7.6×10^{-3})	5.2×10^{-2} (5.2×10^{-3})
^{125}I NaI	1 (0.03)	1.8×10^{-2} (1.8×10^{-3})	9.5×10^{-3} (9.5×10^{-4})	3.5×10^{-3} (3.5×10^{-4})	2.3×10^{-3} (2.3×10^{-4})
^{131}I Hippuran					
renal function	1.3 (0.035)	8.3×10^{-2} (8.3×10^{-3})	6.5×10^{-2} (6.5×10^{-3})	2.5×10^{-2} (2.5×10^{-3})	2.3×10^{-2} (2.3×10^{-3})

renal imaging	1.3	8.3×10^{-2}	6.5×10^{-2}	2.5×10^{-2}	2.3×10^{-2}
	(0.035)	(8.3×10^{-3})	(6.5×10^{-3})	(2.5×10^{-3})	(2.3×10^{-3})
^{131}I HSA	0.5	2.6×10^{-1}	9.0×10^{-2}	8.0×10^{-2}	6.5×10^{-2}
	(0.013)	(2.6×10^{-2})	(9.0×10^{-3})	(8.0×10^{-3})	(6.5×10^{-3})
^{131}I MAA	55	3.7×10^{0}	2.3×10^{0}	2.2×10^{0}	2.3×10^{0}
	(1.5)	(3.7×10^{-1})	(2.3×10^{-1})	(2.2×10^{-1})	(2.3×10^{-1})
^{131}I MIBG	20	2.2×10^{0}	1.1×10^{0}	7.6×10^{-1}	7.0×10^{-1}
	(0.5)	(2.2×10^{-1})	(1.1×10^{-1})	(7.6×10^{-2})	(7.0×10^{-2})
^{131}I NaI (Diagnostic)					
thyroid uptake	0.55	4.0×10^{-2}	3.7×10^{-2}	1.3×10^{-1}	1.5×10^{-1}
	(0.015)	(4.0×10^{-3})	(3.7×10^{-3})	(1.3×10^{-2})	(1.5×10^{-2})
scintiscanning	4	2.9×10^{-1}	2.7×10^{-1}	9.2×10^{-1}	1.1×10^{0}
	(0.11)	(2.9×10^{-2})	(2.7×10^{-2})	(9.2×10^{-2})	(1.1×10^{-1})
localization of extra-thyroid metastases	40	2.9×10^{0}	2.7×10^{0}	9.2×10^{0}	1.1×10^{1}
	(1.1)	(2.9×10^{-1})	(2.7×10^{-1})	(9.2×10^{-1})	(1.1×10^{0})
^{131}I NaI (Therapeutic)					
hyperthyroidism	350	2.5×10^{1}	2.3×10^{1}	8.1×10^{1}	9.5×10^{1}
	(9.5)	(2.5×10^{0})	(2.3×10^{0})	(8.1×10^{0})	(9.5×10^{0})
ablation of normal thyroid tissue	1900	1.4×10^{2}	1.3×10^{2}	4.4×10^{2}	5.1×10^{2}
	(50)	(1.4×10^{1})	(1.3×10^{1})	(4.4×10^{1})	(5.1×10^{1})
^{131}I Rose Bengal	0.04	8.8×10^{-3}	8.8×10^{-3}	6.4×10^{-3}	3.6×10^{-3}
	(0.001)	(8.8×10^{-4})	(8.8×10^{-4})	(6.4×10^{-4})	(3.6×10^{-4})
^{111}In DTPA	20	1.3×10^{0}	9.6×10^{-1}	4.0×10^{-1}	3.6×10^{-1}
	(0.5)	(1.3×10^{-1})	(9.6×10^{-2})	(4.0×10^{-2})	(3.6×10^{-2})
^{111}In Pentetreotide					
planar imaging	110	9.0×10^{0}	6.6×10^{0}	3.8×10^{0}	3.4×10^{0}
	(3)	(9.0×10^{-1})	(6.6×10^{-1})	(3.8×10^{-1})	(3.4×10^{-1})
SPECT imaging	230	1.9×10^{1}	1.4×10^{1}	8.0×10^{0}	7.0×10^{0}
	(6)	(1.9×10^{0})	(1.4×10^{0})	(8.0×10^{-1})	7.0×10^{-1})
^{111}In Platelets	10	1.7×10^{0}	1×10^{0}	9.9×10^{-1}	8.9×10^{-1}
	(0.25)	(1.7×10^{-1})	(1.1×10^{-1})	(9.9×10^{-2})	(8.9×10^{-2})
^{111}In White Blood Cell	20	2.6×10^{0}	1.9×10^{0}	1.9×10^{0}	1.9×10^{0}
	(0.5)	(2.6x10-1)	(1.9×10^{-1})	(1.9×10^{-1})	(1.9×10^{-1})
^{81m}Kr Gas	600	1.1×10^{-4}	1.0×10^{-4}	1.6×10^{-4}	2.0×10^{-4}
	(15)	(1.1×10^{-5})	(1.0×10^{-5})	(1.6×10^{-5})	(2.0×10^{-5})
^{99m}Tc Disofenin	350	6.0×10^{0}	5.2×10^{0}	4.2×10^{0}	2.3×10^{0}
	(9.5)	(6.0×10^{-1})	(5.2×10^{-1})	(4.2×10^{-1})	(2.3×10^{-1})
^{99m}Tc DMSA	220	1.1×10^{0}	1.0×10^{0}	8.8×10^{-1}	7.5×10^{-1}
	(6)	(1.1×10^{-1})	(1.0×10^{-1})	(8.8×10^{-2})	(7.5×10^{-2})
^{99m}Tc DTPA					
kidney imaging & glomular filtration	750	9.0×10^{0}	6.5×10^{0}	3.1×10^{0}	3.5×10^{0}
	(20)	(9.0×10^{-1})	(6.5×10^{-1})	(3.1×10^{-1})	(3.5×10^{-1})
brain imaging & renal perfusion	750	9.0×10^{0}	6.5×10^{0}	3.1×10^{0}	3.5×10^{0}
	(20)	(9.0×10^{-1})	(6.5×10^{-1})	(3.1×10^{-1})	(3.5×10^{-1})
1st pass	350	4.2×10^{0}	3.0×10^{0}	1.4×10^{0}	1.6×10^{0}
	(9.5)	(4.2×10^{-1})	(3.0×10^{-1})	(1.4×10^{-1})	(1.6×10^{-1})
gastric reflux	10	1.2×10^{-1}	8.7×10^{-2}	4.1×10^{-2}	4.7×10^{-2}
	(0.27)	(1.2×10^{-2})	(8.7×10^{-3})	(4.1×10^{-3})	(4.7×10^{-3})
hypertension	800	9.6×10^{0}	7.0×10^{0}	3.3×10^{0}	3.8×10^{0}
	(22)	(9.6×10^{-1})	(7.0×10^{-1})	(3.3×10^{-1})	(3.8×10^{-1})
residual urine determination	350	4.2×10^{0}	3.0×10^{0}	1.4×10^{0}	1.6×10^{0}
	(9.5)	(4.2×10^{-1})	(3.0×10^{-1})	(1.4×10^{-1})	(1.6×10^{-1})
^{99m}Tc DTPA Aerosol	40	2.3×10^{-1}	1.7×10^{-1}	9.2×10^{-2}	1.2×10^{-1}
	(1.1)	(2.3×10^{-2})	(1.7×10^{-2})	(9.2×10^{-3})	(1.2×10^{-2})
^{99m}Tc Glucoheptonate					
renal imaging	750	9.0×10^{0}	8.2×10^{0}	4.0×10^{0}	3.4×10^{0}

	(20)	(9.0×10^{-1})	(8.2×10^{-1})	(4.0×10^{-1})	(3.4×10^{-1})
brain imaging	750	9.0×10^{0}	8.2×10^{0}	4.0×10^{0}	3.4×10^{0}
	(20)	(9.0×10^{-1})	(8.2×10^{-1})	(4.0×10^{-1})	(3.4×10^{-1})
^{99m}Tc HDP	750	3.9×10^{0}	4.10×10^{0}	2.3×10^{0}	1.9×10^{0}
	(20)	(3.9×10^{-1})	(4.0×10^{-1})	(2.3×10^{-1})	(1.9×10^{-1})
^{99m}Tc HMPAO	750	6.5×10^{0}	5.0×10^{0}	3.6×10^{0}	2.7×10^{0}
	(20)	(6.5×10^{-1})	(5.0×10^{-1})	(3.6×10^{-1})	(2.7×10^{-1})
^{99m}Tc Human Serum Albumin	200	1.0×10^{0}	6.0×10^{-1}	5.2×10^{-1}	4.4×10^{-1}
	(5.5)	(1.0×10^{-1})	(6.0×10^{-2})	(5.2×10^{-2})	(4.4×10^{-2})
^{99m}Tc MAA					
hepatic artery perfusion	150	4.2×10^{-1}	6.0×10^{-1}	7.5×10^{-1}	6.0×10^{-1}
	(4)	(4.2×10^{-2})	(6.0×10^{-2})	(7.5×10^{-2})	(6.0×10^{-2})
lung imaging	200	5.6×10^{-1}	8.0×10^{-1}	1.0×10^{0}	8.0×10^{-1}
	(5.5)	(5.6×10^{-2})	(8.0×10^{-2})	(1.0×10^{-1})	(8.0×10^{-2})
isotopic venography	220	6.2×10^{-1}	8.8×10^{-1}	1.1×10^{0}	8.0×10^{-1}
	(6)	(6.2×10^{-2})	(8.8×10^{-2})	(1.1×10^{-1}	(8.0×10^{-2})
LeVeen shunt patency	110	3.1×10^{-1}	4.4×10^{-1}	5.5×10^{-1}	4.4×10^{-1}
	(3)	(3.1×10^{-2})	(4.4×10^{-2})	(5.5×10^{-2})	(4.4×10^{-2})
^{99m}Tc MAG3	750	1.4×10^{1}	1.0×10^{1}	4.1×10^{0}	3.9×10^{0}
	(20)	(1.4×10^{0})	(1.0×10^{0})	(4.1×10^{-1})	(3.9×10^{-1})
^{99m}Tc MDP	750	4.6×10^{0}	4.0×10^{0}	2.0×10^{0}	1.8×10^{0}
	(20)	(4.6×10^{-1})	(4.0×10^{-1})	(2.0×10^{-1})	(1.8×10^{-1})
^{99m}Tc MIBI-rest	1100	1.7×10^{1}	1.3×10^{1}	9.2×10^{0}	5.9×10^{0}
	(30)	(1.7×10^{0})	(1.3×10^{0})	(9.2×10^{-1})	(5.9×10^{-1})
^{99m}Tc MIBI-stress	1100	1.3×10^{1}	1.0×10^{1}	7.6×10^{0}	4.8×10^{0}
	(30)	(1.3×10^{0})	(1.0×10^{0})	(7.6×10^{-1})	(4.8×10^{-1})
^{99m}Tc Pertechnetate					
brain imaging	1100	1.2×10^{1}	2.4×10^{1}	1.5×10^{1}	1.0×10^{1}
	(30)	(1.2×10^{0})	(2.4×10^{0})	(1.5×10^{0})	(1.0×10^{0})
thyroid imaging	400	4.4×10^{0}	8.8×10^{0}	5.6×10^{0}	3.7×10^{0}
	(11)	(4.4×10^{-1})	(8.8×10^{-1})	(5.6×10^{-1})	(3.7×10^{-1})
salivary gland imaging	200	2.2×10^{0}	4.4×10^{0}	2.8×10^{0}	1.9×10^{0}
	(5.5)	(2.2×10^{-1})	(4.4×10^{-1})	(2.8×10^{-1})	(1.9×10^{-1})
placental localization	110	1.1×10^{0}	2.4×10^{0}	1.5×10^{0}	1.0×10^{0}
	(3)	(1.1×10^{-1})	(2.4×10^{-1})	(1.5×10^{-1})	(1.0×10^{-1})
blood pool imaging	1100	1.1×10^{1}	2.4×10^{1}	1.4×10^{1}	1.0×10^{1}
	(30)	(1.1×10^{0})	(2.4×10^{0})	(1.4×10^{0})	(1.0×10^{0})
cardiovascular shunt	550	6.0×10^{0}	1.2×10^{1}	7.7×10^{0}	5.1×10^{0}
detection	(15)	(6.0×10^{-1})	(1.2×10^{0})	(7.7×10^{-1})	(5.1×10^{-1})
1st pass	550	6.0×10^{0}	1.2×10^{1}	7.7×10^{0}	5.1×10^{0}
	(15)	(6.0×10^{-1})	(1.2×10^{0})	(7.7×10^{-1})	(5.1×10^{-1})
^{99m}Tc PYP					
skeletal imaging	550	3.3×10^{0}	3.6×10^{0}	2.0×10^{0}	1.6×10^{0}
	(15)	(3.3×10^{-1})	(3.6×10^{-1})	(2.0×10^{-1})	(1.6×10^{-1})
cardiac imaging	700	4.2×10^{0}	4.6×10^{0}	2.5×10^{0}	2.0×10^{0}
	(19)	4.2×10^{0}	4.6×10^{0}	2.5×10^{0}	2.0×10^{0}
	(19)	(4.2×10^{-1})	(4.6×10^{-1})	(2.5×10^{-1})	(2.0×10^{-1})
^{99m}Tc RBC - in vitro labeling	930	6.3×10^{0}	4.4×10^{0}	3.2×10^{0}	2.6×10^{0}
	(25)	(6.3×10^{-1})	(4.4×10^{-1})	(3.2×10^{-1})	(2.6×10^{-1})
^{99m}Tc RBC - in vivo labeling					
rest	550	3.5×10^{0}	2.4×10^{0}	1.8×10^{0}	1.5×10^{0}
	(15)	(3.5×10^{-1})	(2.4×10^{-1})	(1.8×10^{-1})	(1.5×10^{-1})
exercise	930	6.0×10^{0}	4.0×10^{0}	3.1×10^{0}	2.5×10^{0}
	(25)	(6.0×10^{-1})	(4.0×10^{-1})	(3.1×10^{-1})	(2.5×10^{-1})
lower GI bleeding	930	6.0×10^{0}	4.0×10^{0}	3.1×10^{0}	2.5×10^{0}
	(25)	(6.0×10^{-1})	(4.0×10^{-1})	(3.1×10^{-1})	(2.5×10^{-1})

^{99m}Tc Sulfur Colloid-normal					
liver-spleen imaging	300	5.4×10^{-1}	6.3×10^{-1}	9.6×10^{-1}	1.1×10^{0}
	(8)	(5.4×10^{-2})	(6.3×10^{-2})	(9.6×10^{-2})	(1.1×10^{-1})
bone marrow imaging	450	8.1×10^{-1}	9.5×10^{-1}	1.4×10^{0}	1.7×10^{0}
	(12)	(8.1×10^{-2})	(9.5×10^{-2})	(1.4×10^{-1})	(1.7×10^{-1})
pulmonary aspiration	20	3.6×10^{-2}	4.2×10^{-2}	6.4×10^{-2}	7.4×10^{-2}
	(0.5)	(3.6×10^{-3})	(4.2×10^{-3})	(6.4×10^{-3})	(7.4×10^{-3})
LeVeen shunt patency	110	2.0×10^{-1}	2.3×10^{-1}	3.5×10^{-1}	4.1×10^{-1}
	(3)	(2.0×10^{-2})	(2.3×10^{-2})	(3.5×10^{-2})	(4.1×10^{-2})
^{99m}Tc White Blood Cells	200	7.6×10^{-1}	5.6×10^{-1}	5.8×10^{-1}	5.6×10^{-1}
	(5.4)	(7.6×10^{-2})	(5.6×10^{-2})	(5.8×10^{-2})	(5.6×10^{-2})
^{201}Tl Chloride					
planar imaging	150	1.5×10^{1}	8.7×10^{0}	7.0×10^{0}	4.0×10^{0}
	(4)	(1.5×10^{0})	(8.7×10^{-1})	(7.0×10^{-1})	(4.0×10^{-1})
SPECT imaging	110	1.1×10^{1}	6.4×10^{0}	5.2×10^{0}	3.0×10^{0}
	(3)	(1.1×10^{0})	(6.4×10^{-1})	(5.2×10^{-1})	(3.0×10^{-1})
myocardial perfusion	55	5.3×10^{0}	3.2×10^{0}	2.6×10^{0}	1.5×10^{0}
	(1.5)	(5.3×10^{-1})	(3.2×10^{-1})	(2.6×10^{-1})	(1.5×10^{-1}
thyroid imaging	80	7.8×10^{0}	4.6×10^{0}	3.8×10^{0}	2.2×10^{0}
	(2.2)	(7.8×10^{-1})	(4.6×10^{-1})	(3.8×10^{-1})	(2.2×10^{-1})
^{133}Xe, injection					
muscle blood flow	20	9.8×10^{-5}	2.0×10^{-5}	2.8×10^{-5}	3.2×10^{-5}
	(0.5)	(9.8×10^{-6})	(2.0×10^{-6})	(2.8×10^{-6})	(3.2×10^{-6})
pulmonary function	1100	5.4×10^{-3}	1.1×10^{-3}	1.5×10^{-3}	1.8×10^{-3}
with imaging	(30)	(5.4×10^{-4})	(1.1×10^{-4})	(1.5×10^{-4})	(1.8×10^{-4})

Sample calculations

With the tables complete, most dose calculations are just a matter of lookup and perhaps interpolation. Given the uncertainties in the numbers, careful interpolation may not be needed. In most cases, one can look at the dose on either side of the actual time of gestation, and just use what is felt to be the most appropriate, most conservative, etc. estimate. During the first, say, 3-6 weeks, the dose to the nongravid uterus (the "early pregnancy" dose) is probably a good estimate of the dose to the fetus.

Example - A woman receives 1000 MBq of Tc-99m MIBI for a cardiac stress test. Later it is found out that she was about 1 week pregnant at the time of the scan. Here, the most appropriate fetal dose is 1000 MBq x 0.012 mGy/MBq = 12 mGy.

Example - A woman receives 200 MBq of Tc-99m MAA for a lung scan at about 7 months' gestation (this is not unusual - some women have a tendency to form blood clots in later pregnancy, and lung scans are often performed on patients known to be pregnant). The dose estimate at 6 months is 200 MBq x 0.005 mGy/MBq = 1 mGy, and the estimate at 9 months is 200 MBq x 0.004 mGy/MBq = 0.8 mGy. Given the uncertainty and the time, I would call the dose estimate 1 mGy.

As shown in the following example, the table of residence times in Russel et al. (1997b) may be used in cases in which the user happens to know something about changes in residence times due to pregnancy, residence times in individual subjects, etc. In this case, a more careful dose calculation may be made using available S values.

Example: 750 MBq Tc-99m DTPA is administered to a woman in early pregnancy, but due to a kidney being blocked, the kidney residence time is thought to be much higher than in the standard model, around 2.5 hours. No estimate is made of the bladder or remainder of the body residence time. The standard dose estimate, as given in the tables is:

$$D_{fetus} = A_0 [\tau_{kidneys} S(uterus \leftarrow kidneys) + \tau_{bladder} S(uterus \leftarrow bladder)$$

$$+ \tau_{remainder} S(uterus \leftarrow remainder)]$$

$$D_{fetus} = 750MBq [0.092\ hr \times 3600\ \text{sec}/hr \times 8.42 \times 10^{-8}\ mGy/MBq - s + 1.84\ hr$$

$$\times 3600\ \text{sec}/hr \times 1.48 \times 10^{-6}\ mGy/MBq - s + 2.84\ hr \times 3600\ \text{sec}/hr \times 2.17 \times 10^{-7}\ mGy/MBq - s]$$

$$D_{fetus} = 9.0\ mGy$$

The new dose, modified for this subject is:

$$D_{fetus} = 750MBq [2.5\ hr \times 3600\ \text{sec}/hr \times 8.42 \times 10^{-8}\ mGy/MBq - s + 1.84\ hr$$

$$\times 3600\ \text{sec}/hr \times 1.48 \times 10^{-6}\ mGy/MBq - s + 2.84\ hr \times 3600\ \text{sec}/hr \times 2.17 \times 10^{-7}\ mGy/MBq - s]$$

$$D_{fetus} = 9.6\ mGy$$

This is a very small change in the dose estimate, which is not surprising, given the small magnitude of the kidney to uterus S-value. Let's consider the situation in which the same woman was encouraged to void her bladder more frequently than in the standard dose estimate for Tc-99m DTPA, and her bladder residence time decreased to 0.9 hr:

$$D_{fetus} = 750MBq [2.5\ hr \times 3600\ \text{sec}/hr \times 8.42 \times 10^{-8}\ mGy/MBq - s + 0.9\ hr$$

$$\times 3600\ \text{sec}/hr \times 1.48 \times 10^{-6}\ mGy/MBq - s + 2.84\ hr \times 3600\ \text{sec}/hr \times 2.17 \times 10^{-7}\ mGy/MBq - s]$$

$$D_{fetus} = 5.8\ mGy$$